L3: Entry 11 of 12 File: USPT Oct 14, 1997

DOCUMENT-IDENTIFIER: US 5678042 A
** See image for Certificate of Correction **
TITLE: Network management system having historical virtual catalog snapshots for overview of historical changes to files distributively stored across network domain

Brief Summary Text (9):
One of the reasons behind this trend is a growing desire in the industry to maintain at least partial system functionality even in the event of a failure in a particular system component. If one of the numerous mini/micro-computers fails, the others can continue to function. If one of the numerous data storage devices fails, the others can continue to provide data access. Also increases in data storage capacity can be economically provided in small increments as the need for increased capacity develops.

Detailed Description Text (18):
The backup storage means 113 can include magnetic disk drives but more preferably comprises DAT (Digital Audio Tape) drives or other forms of tape drives or other cost-efficient backup storage devices. A backup copy of each file held in primary or secondary storage (111, 112) is preferably made on a periodic basis (e.g., nightly or every weekend) so that a relatively recent copy of a given file can be retrieved even in the case where the corresponding primary or secondary storage means (111, 112) suffers catastrophic failure; e.g., a head crash or destruction.

Detailed Description Text (23):
The data files of the primary, secondary and backup storage means 111-113 can be organized conventionally or distributed redundantly across a plurality of drives in accordance with a practice known as RAID (Redundant Array of Inexpensive Data-storage drives). A detailed description of the intricacies involved in managing a RAID system may be found in the above-cited patent application, SCSI-COUPLED MODULE FOR MONITORING AND CONTROLLING SCSI-COUPLED RAID BANK AND BANK ENVIRONMENT, which application is incorporated herein by reference. As such these will not be detailed here. In brief, each file is distributively stored across two or more storage drives so that failure of a single drive will not interfere with the accessibility or integrity of a stored file. The dashed symbol 115 for a RAID bank indicates the possibility of file distribution across redundant drives.

Detailed Description Text (78):
FIGS. 4A and 4B show side-by-side examples of pie charts 401 and 411 showing used versus free storage space on respective drives DRIVE-A and DRIVE-B within the domain. (Note that pie 411 has a smaller diameter than pie 401 thereby indicating a smaller maximum capacity level (MAX).) A large number of side-by-side pie charts (or bar charts--with used part of capacity rectangle shaded and unused part unshaded) can be displayed on the screen of the system administrator's workstation (160) at one time to give the administrator an instantaneous appreciation storage capacity and utilization across a substantial part if not all of the domain. If historical trends are to be viewed on a pie or bar chart, different colors or fill patterns can be assigned to slices of a pie or bar chart to represent incremental changes over time.

Detailed Description Text (215):

Backup instructions 614 indicate when the backup activities of that DAS-managed file server 110 should begin and which files should be backed up (e.g. all or only those that have been altered in the last day). An API-like interface connects the local backup field agent 119b to the corresponding local backup execution program 117. The API-like interface, as will be understood by those skilled in the art, translates between a domain-wide standard data format and a local format used by the local backup execution program 117 much as a general purpose API (application program interface) provides interfacing between an operating system kernel and a specialized application program.

Detailed Description Text (231):
On occasion, problems develop which need to be brought to the immediate attention of a network administrator (artificial one 150.27 or a human one). Examples of such problems include non-recoverable failures of storage devices 111-114, a failure within a power supply 181, failure of a temperature control device 182, security breach such as the opening of an alarmed cabinet door 183, or a connection break as noted by a connection checking module 184. These type of events are referred to herein as immediate-attention events.

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L3: Entry 12 of 12 File: USPT Feb 27, 1996

DOCUMENT-IDENTIFIER: US 5495607 A
TITLE: Network management system having virtual catalog overview of files distributively stored across network domain

Brief Summary Text (9):
One of the reasons behind this trend is a growing desire in the industry to maintain at least partial system functionality even in the event of a failure in a particular system component. If one of the numerous mini/micro-computers fails, the others can continue to function. If one of the numerous data storage devices fails, the others can continue to provide data access. Also increases in data storage capacity can be economically provided in small increments as the need for increased capacity develops.

Detailed Description Text (18):
The backup storage means 113 can include magnetic disk drives but more preferably comprises DAT (Digital Audio Tape) drives or other forms of tape drives or other cost-efficient backup storage devices. A backup copy of each file held in primary or secondary storage (111, 112) is preferably made on a periodic basis (e.g., nightly or every weekend) so that a relatively recent copy of a given file can be retrieved even in the case where the corresponding primary or secondary storage means (111, 112) suffers catastrophic failure; e.g., a head crash or destruction.

Detailed Description Text (23):
The data files of the primary, secondary and backup storage means 111-113 can be organized conventionally or distributed redundantly across a plurality of drives in accordance with a practice known as RAID (Redundant Array of Inexpensive Data-storage drives). A detailed description of the intricacies involved in managing a RAID system may be found in the above-cited patent application, SCSI-COUPLED MODULE FOR MONITORING AND CONTROLLING SCSI-COUPLEDRAID BANK-AND-BANK ENVIRONMENT, which application is incorporated herein by reference. As such these will not be detailed here. In brief, each file is distributively stored across two or more storage drives so that failure of a single drive will not interfere with the accessibility or integrity of a stored file. The dashed symbol 115 for a RAID bank indicates the possibility of file distribution across redundant drives.

Detailed Description Text (78):
FIGS. 4A and 4B show side-by-side examples of pie charts 401 and 411 showing used versus free storage space on respective drives DRIVE-A and DRIVE-B within the domain. (Note that pie 411 has a smaller diameter than pie 401 thereby indicating a smaller maximum capacity level (MAX).) A large number of side-by-side pie charts (or bar charts----with used part of capacity rectangle shaded and unused part unshaded) can be displayed on the screen of the system administrator's workstation (160) at one time to give the administrator an instantaneous appreciation storage capacity and utilization across a substantial part if not all of the domain. If historical trends are to be viewed on a pie or bar chart, different colors or fill patterns can be assigned to slices of a pie or bar chart to represent incremental changes over time.

Detailed Description Text (105):
Backup instructions 614 indicate when the backup activities of that DAS-managed file server 110 should begin and which files should be backed up (e.g. all or only those that have been altered in the last day). An API-like interface connects the local backup field agent 119b to the corresponding local backup execution program 117. The API-like interface, as will be understood by those skilled in the art, translates between a domain-wide standard data format and a local format used by the local backup execution program 117 much as a general purpose API (application program interface) provides interfacing between an operating system kernel and a specialized application program.

Detailed Description Text (121):
On occasion, problems develop which need to be brought to the immediate attention of a network administrator (artificial one 150.27 or a human one). Examples of such problems include non-recoverable failures of storage devices 111-114, a failure within a power supply 181, failure of a temperature control device 182, security breach such as the opening of an alarmed cabinet door 183, or a connection break as noted by a connection checking module 184. These type of events are referred to herein as immediate-attention events. @ When an immediate-attention event occurs, the corresponding domain/local exchange agent 119-149 issues an SNMP alert report out onto the network backbone 105. The backbone monitor 150.23 includes an SNMP monitor portion which monitors the backbone 105 and distinguishes normal reports from such immediate-notification/action reports. The immediate-attention SNMP reports are tagged as such by the SNMP monitor and forwarded to the artificial administrator 150.25 as indicated by signal flow line 622. The artificial administrator 150.25 uses rule base 150.1 to determine what level of response should accompany each SNMP immediate-attention report. A high-urgency report might require immediate shutdown of part or all of the network. The rules of rule base 150.1 may dictate that an urgent alert message be sent to one or more human administrators by way of the communications gateway 104, 106 (FIG. 1) to their respective wireless pagers (beepers) 107. In some cases, corrective reconfiguration with or without shutdown of various portions of the network may be put off to a later, less congested portion of the day. In such a case, the corrective action would be sent to the task scheduler 150.22. Cooperative signal exchanges between the artificial administrator 150.25 and the task scheduler 150.22 are denoted by signal flow line 625.

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